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## A NEW SPECIES OF *TELEORHINUS* FROM THE BENTON SHALES


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### INTRODUCTION

In 1903, Barnum Brown collected some crocodilian remains from the Benton Shales near Pryor, Montana. These remains consisted of two complete skulls with jaws, and an unassociated pair of jaws, besides limb and girdle bones and vertebrae. In 1904, Osborn described one skull and jaws, with vertebrae (Amer. Mus. No. 5851) as *Teleorhinus browni*. Later (1933) this skull was described in greater detail by myself. The other skull (Amer. Mus. No. 5850) has never been described. It is obviously different in characters from *Teleorhinus browni*. The unassociated jaws agree in characters with the jaws of the second skull (Amer. Mus. No. 5850) but not with *T. browni*. This material is now used as the type of a new species which may be called **Teleorhinus robustus.**

**Teleorhinus robustus,** new species

TYPE.—Amer. Mus. No. 5850. Complete skull with incomplete lower jaws.

PARATYPE.—Amer. Mus. No. 5849. Complete lower jaws, scapula, humerus, coracoid, plates and vertebrae.

TYPE LOCALITY AND LEVEL.—Twelve miles east of Pryor, Montana, Benton Shales of lower Cretaceous age.

DEFINITION.—Characters of the Genus *Teleorhinus:* cranium much higher and broader, and bones more massive; snout shorter and broader than in *T. browni*. Principal cavities of the skull larger than in *T. browni*. Mandible much stouter than in *T. browni*, the breadth is greater in proportion to the length, and the symphysis is relatively shorter.

### DESCRIPTION OF TYPE AND PARATYPE

#### SKULL

##### General Form

The skull is long and slender, but is not excessively slender as in *Teleorhinus browni*. The maximum breadth is about ten times the width of the snout at its narrowest point. The point of maximum breadth is far back, across the quadratojugals, but it is not posterior to the cranium.

[1]Contributions to the Osteology, Affinities, and Distribution of the Crocodilia, No. 29.

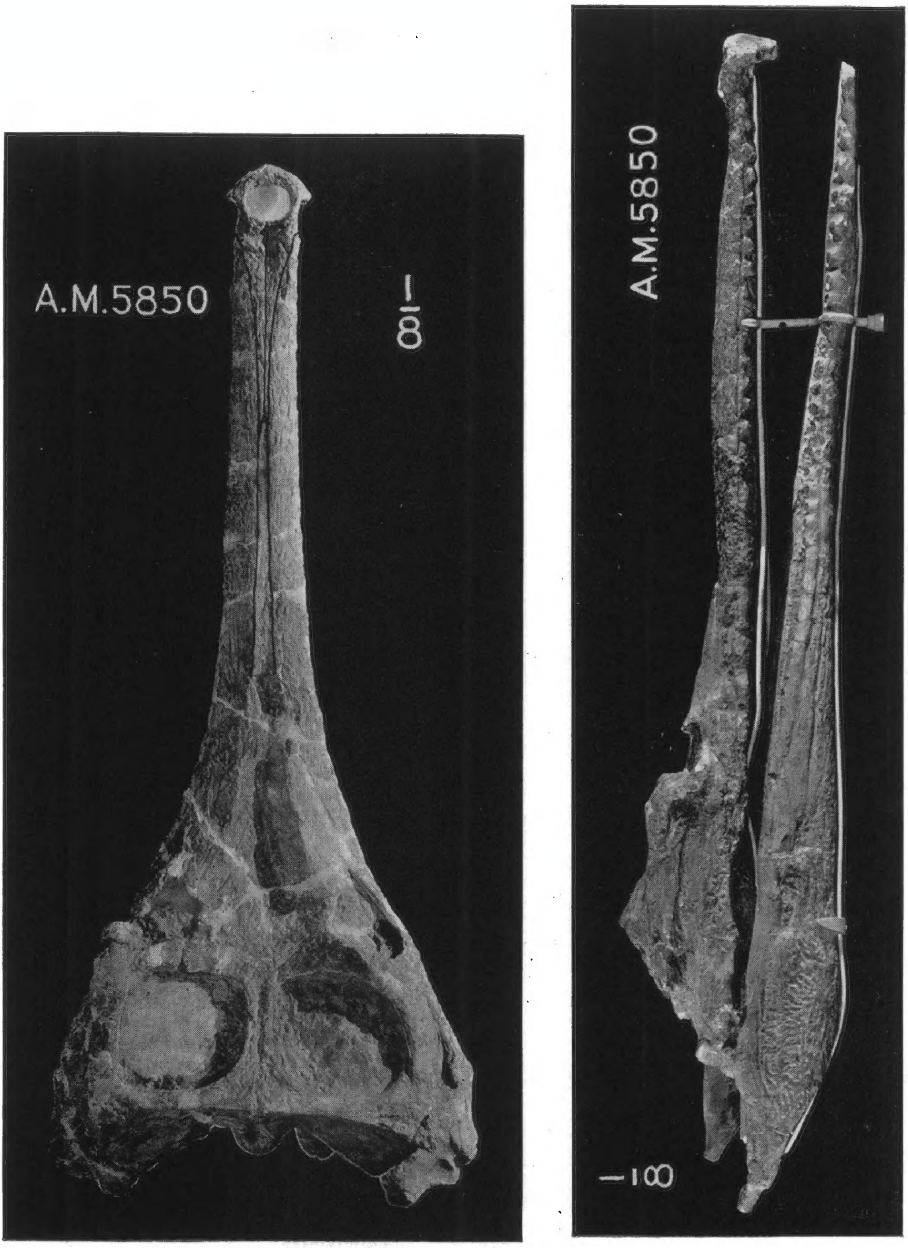


Fig. 1A. Fig. 1B.

Fig. 1. *Teleorhinus robustus*, new species. Type, skull and jaws, Amer. Mus. No. 5850. One-eighth natural size. A, superior view; B, lateral view, right side.

The cranial table is only moderately developed as a unit by itself. It narrows anteriorly. The snout narrows gradually in the anterior direction, much as in *Tomistoma*. The tip of the snout is bent sharply downward as in *T. browni*.

## Cavities of the Skull

SUPRATEMPORAL FENESTRAE.—These cavities are of moderate size. They are relatively large compared with those of short-snouted crocodilians, but relatively small in comparison with many teleosaurs. They are between subcircular and subquadrangular in outline. The transverse diameter of each fenestra is greater than the antero-posterior diameter in about the proportion of eight to seven. The interfenestral bar is of moderate width; the postorbito-squamosal bars separating these fenestrae from the lateral temporal fenestrae are relatively stout.

LATERAL-TEMPORAL FENESTRAE.—These openings are long and appear to have been rather low vertically. This region of the skull has been crushed downward somewhat, rendering it impossible to distinguish the original outlines of these cavities. The small vertical height is undoubtedly due only in part to crushing, however.

ORBITS.—The orbits are much smaller in size than the supratemporal fenestrae. In fact they appear to be relatively smaller than in most crocodilians. They are subcircular in outline, and face chiefly forward, and also partly upward and outward. The outward component of direction is greater than in *T. browni*.

EXTERNAL NARIAL APERTURE.—This cavity occupies nearly the full breadth of the anterior end of the snout. It is subcircular in outline, but its breadth is slightly greater than its length. It is situated entirely anterior to the level of the first maxillary teeth. It covers at least twice the area on the snout that is covered by the aperture in the type of *T. browni*.

INFERIOR PREMAXILLARY FORAMEN.—This opening is not clearly outlined in the specimen. It could not have been large, and it may have been absent. On the other hand it may have been present as a very small opening in a region now occupied by matrix.

PALATINE FENESTRAE.—These fenestrae are long and narrow, and are somewhat irregular in outline. They extend far back on the ventral surface of the skull, leaving only a very short pterygoidal region between them and the posterior border. The space between the fenestrae is relatively broad; it is much broader than the maxillary walls that bound the fenestrae externally.

The region of the internal narial aperture is not sufficiently well preserved to permit description.

## The Bones of the Skull

PREMAXILLARIES.—The tips of the premaxillaries bend sharply downward. The posterior processes are very slender. They extend backward to the level of the tenth maxillary teeth. At this level they are wedged apart from each other by the anterior processes of the nasals.

On the palate the premaxillaries extend rather far back, reaching the level of the space between the fourth and fifth maxillary teeth. This portion of the premaxillo-maxillary suture is very irregular. Five alveoli are present in each premaxillary. All of these are located on the downward-turned tip of the snout, and they are all essentially in the same fore and aft level, all ten avleoli being arranged almost in a straight

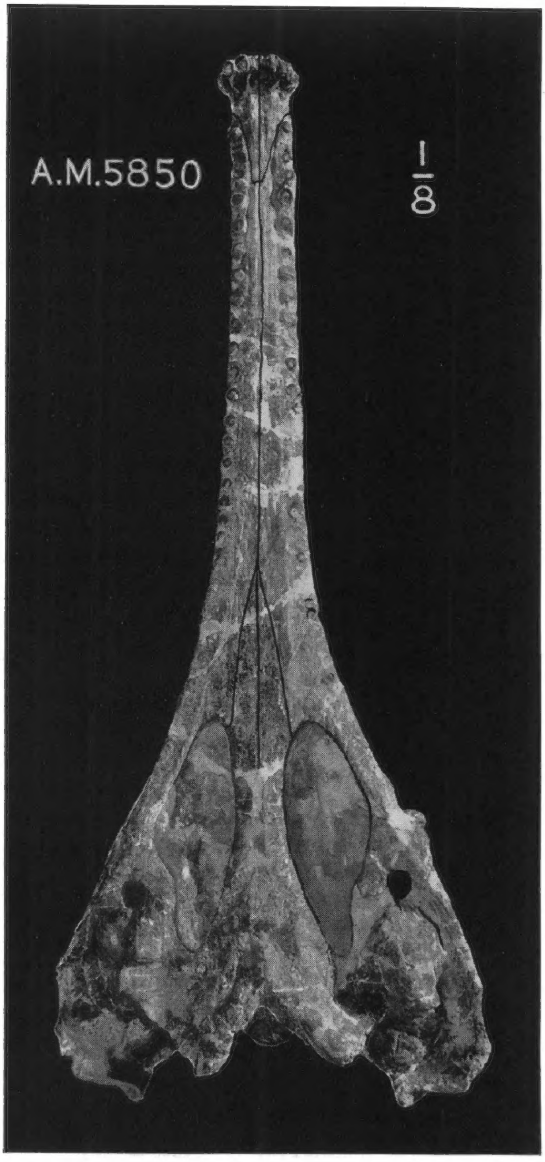


Fig. 2. *Teleorhinus robustus*, new species. Type, skull, Amer. Mus. No. 5850. One-eighth natural size. Inferior view.

line. The second and third alveoli are the largest in the series and are essentially equal in size. The first and fourth are slightly smaller than the second and third, and are subequal in size. The fifth is the smallest of the premaxillary alveoli. The first three alveoli are situated on the same horizontal level, and essentially on the same fore and aft level; they are close together. The fourth alveoli are separated from the third by a short space; they are much higher in horizontal level, and are very slightly farther back. The fifth alveoli are separated slightly from the fourth; they are higher in horizontal level, and are very slightly farther back.

MAXILLARIES.—The maxillary bones are long and slender. Their contacts with the premaxillaries, on the snout, are about half as long as their contact with the nasals. At the lateral margins they extend back as far as the anterior ends of the orbits.

The premaxillo-maxillary suture on the palate has been described in connection with the description of the premaxillary bones. There is a distinct longitudinal groove separating the palatine portion of each maxillary from the dental border. This is undoubtedly an original character and is not the result of crushing.

The number of teeth in each maxillary is somewhat uncertain, owing to the state of preservation of the specimen. The number is probably thirty-nine, but it may possibly be thirty-eight or forty.

The first fifteen are located on distinct pedicles, and are rather widely separated from each other. These alveoli are essentially uniform in size and are large, being about twice the diameter of the corresponding teeth in *T. browni*. The diameter of each alveolus is about 10 mm. and the spaces between the alveoli are 15 mm.

The maxillo-palatine suture is somewhat obscure, but its form can be determined. It is very short, extending only a short distance forward beyond the anterior ends of the palatine fenestrae. It extends forward and slightly inward from the internal border of each palatine fenestra, near the anterior end of the latter, then curves symmetrically inward toward the mid-line, meeting the latter at a point forty-three millimeters anterior to the level of the anterior tips of the palatine fenestrae, and thence to the opposite side. In form the suture is simple, being essentially a U with slightly diverging arms. It apparently lacks the complex secondary bend near each palatine fenestra that is characteristic of the later crocodilians.

LACRYMALS.—The lacrymal bones are fairly well preserved. They extend forward to the level of the twenty-fifth maxillary teeth. They are long and slender in form. Their contacts with the nasals were apparently short.

PREFRONTALS.—The prefrontals are not as well preserved as are the lacrymals. They appear to be considerably shorter than the lacrymals, and to be somewhat broader at their posterior ends. They occupied more of the orbital borders than did the lacrymals.

FRONTAL.—The outlines of the frontal cannot be distinguished completely, but some portions of them are clear, and other portions are somewhat dimly suggested. The anterior wedge, separating the posterior tips of the nasals, is short and broad. It appears to extend forward to a level slightly anterior to the anterior ends of the orbits. The distance from this level to the anterior ends of the orbits is equal to about one half the antero-posterior diameter of each orbit. The extent of the orbital border occupied by the frontal is not clear, but it appears to be small.

The frontal definitely forms part of the anterior border of each supratemporal fenestra.

POSTORBITALS.—The postorbitals form a greater portion of the supratemporal fenestrae than does the frontal. They also occupy about half of the lateral border of each of these fenestrae. Each postorbital is stoutly constructed, especially at the antero-external corner.

SQUAMOSALS.—The squamosals occupy only one-half the external borders of the supratemporal fenestrae, and about two-fifths of their posterior borders. The external bars of the squamosals are stout, resembling the corresponding bars of the postorbitals. The posterior bar is slender. The postero-external corners are not produced into prominent elevations.

JUGALS.—The jugal bones are long and slender; the jugal bar is much more slender than the postorbito-squamosal bar. The jugals appear to extend forward to a level three to four centimeters anterior to the anterior borders of the orbits.

QUADRATOJUGALS.—The quadratojugals are unusually short. Their contacts with the jugals appear to be only slightly anterior to the level of the posterior ends of the supratemporal fenestrae.

QUADRATES.—The bones are massively constructed especially for a slender-snouted form. Their articular processes are short and broad. The articular surfaces are irregular and are unusually twisted in appearance.

PARIETAL.—The parietal bone is distinctive in character. Its contact with the frontal is not clear. It appears to occupy no part of the anterior border of either supratemporal fenestra, but this is not certain. It may occupy a small portion of each anterior border. The interpretation to be made, in this respect, depends upon the identification of certain indistinct partings as sutures or as cracks. The anterior portion of the interfenestral bar is narrow, but the posterior portion broadens rapidly. The posterior transverse bars of the bone, each of which forms about two-thirds of the posterior border of the corresponding supratemporal fenestra, are long and slender.

SUPRAOCCIPITAL.—The outlines of this bone are not entirely clear, but it occupies a very small area of the skull-top. The bone forms a considerable portion of the occipital surface of the skull.

EXOCCIPITALS.—The exoccipitals are not distinctive, except for the fact that the paroccipital processes are stoutly constructed.

BASIOCCIPITAL.—The basioccipital is distinctive in that the occipital condyle is very stout. This fact becomes very apparent when this skull is compared with that of *T. browni*.

PALATINES.—The palatines, as indicated in the preceding paragraph, do not extend very far forward. They are somewhat broader than is usual in a long-snouted skull of this size, separating the fenestrae somewhat widely. The relations with the pterygoids cannot be distinguished.

PTERYGOIDS.—The pterygoids are very poorly preserved. The bones have two heavily-built processes extending postero-externally from the mid-line. The two pterygoids together form a letter Y.

OTHER BONES.—The other bones of the skull are either poorly preserved or are not sufficiently well preserved to warrant description.

## Lower Jaws

### General Form

The lower jaws in the type are imperfectly preserved. Their posterior portions are essentially complete, but over half of the symphysial region is lacking. This portion has been restored, using the characters of the paratype, and the dimensional limits of the skull.

The paratype specimen (Amer. Mus. No. 5849) is complete except for a few minor details. It was collected in the same locality as the type, and from the same beds. It belonged to a larger individual than the type specimen.

The two rami of the lower jaw form a letter Y, whose arms are longer than its base. The symphysis, comprising the base, or upright, of the Y, is slightly over one-third of the entire jaw in length. The symphysis is thus relatively shorter than in *T. browni*. The breadth of the mandible at its posterior end is relatively about one and one-half times as great as in *T. browni*. The vertical height of each ramus near its posterior end is correspondingly great. The symphysis is broader than in *T. browni* and is thin vertically as in that species. The ratio of height to breadth is about the same in the two species, but both of these dimensions are greater in proportion to the length in the new species than in *T. browni*.

The external mandibular foramen is very small. Its length is much greater than its height.

### The Bones of the Lower Jaws

Dentaries.—The dentaries comprise most of the symphysis, and large portions of the posterior bars. The number of teeth in each dentary is not absolutely certain, as the alveolar borders are not perfect in either specimen. It appears to be thirty-four, but may be thirty-five. The first two pairs of teeth are small, and the rest are somewhat larger. The posterior teeth are, on the whole, smaller and closer together than the anterior ones. All of the teeth are stouter than those of *T. browni*. The first ten or twelve teeth are rather widely separated from each other, and were nearly vertical in position. The remaining teeth were closer together, and were directed obliquely outward and upward. The symphysis ends at the twenty-second teeth.

Splenials.—These bones are long, and their anterior processes are stout. The anterior processes comprise part of the symphysis, extending forward to the level of the twelfth or thirteenth maxillary teeth.

Surangulars and Complimentaries.—These bones are not sufficiently distinctive to warrant special description.

Angulars.—The angulars are large and massive. They comprise considerable portions of the large postarticular processes.

Articulars.—These bones are massively constructed, both in the region of the large glenoid surfaces and of the postarticular processes.

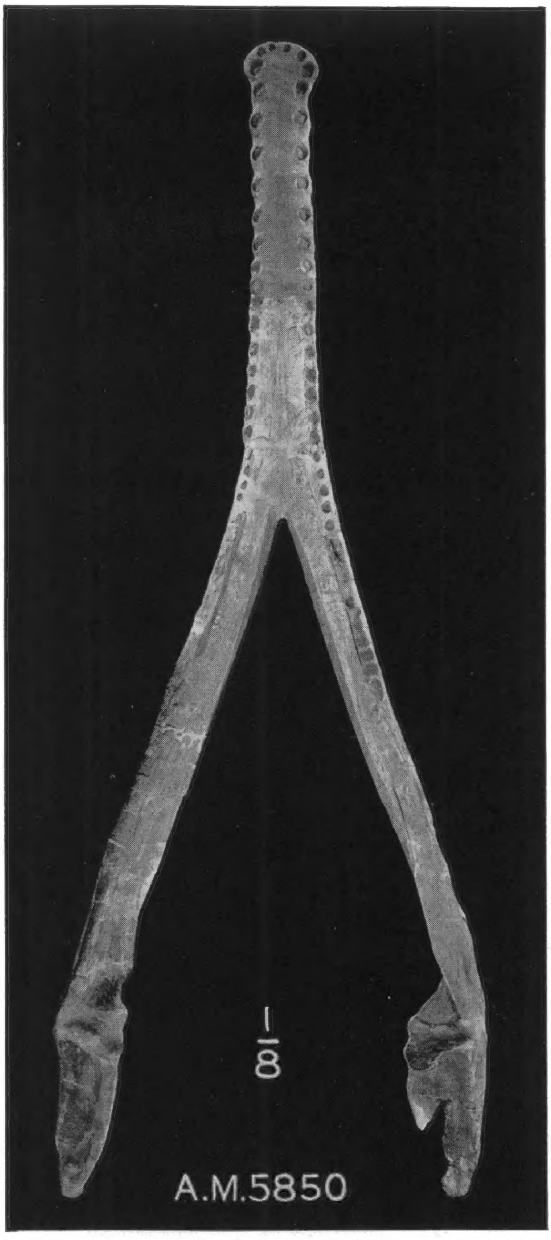


Fig. 3. *Teleorhinus robustus*, new species. Type, lower jaws, Amer. Mus. No. 5850. One-eighth natural size. Superior view.

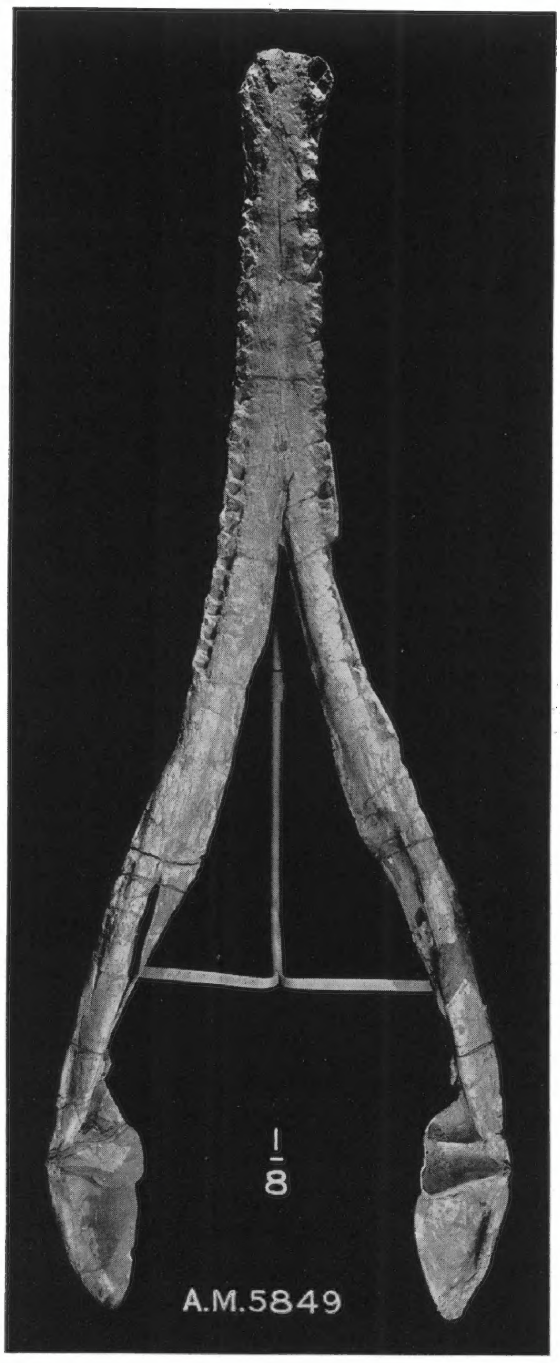


Fig. 4. *Teleorhinus robustus*, new species. Paratype, lower jaws, Amer. Mus. No. 5849. One-eighth natural size. Superior view.

## Measurements

Skull.—Type, Amer. Mus. No. 5850.

| | mm. |
|---|---|
| Length, tip of premaxillaries to posterior border of cranial table at mid-line | 910 |
| Length, tip of premaxillaries to occipital condyle | 969 |
| Length, tip of premaxillaries to level of articular surfaces of quadrates | 1022 |
| Breadth, across quadrato-jugals | 438 |
| Breadth of occiput, maximum | 340 |
| Breadth, across both supratemporal fenestrae | 286 |
| Breadth of interfenestral bar | 20 |
| Breadth across orbits, maximum | 277 |
| Breadth of interorbital plate | 135 |
| Breadth of snout at base | 222 |
| Breadth of snout, minimum | 64 |
| Breadth of snout at tip | 83 |
| Length of snout | 678 |
| Length of right supratemporal fenestra | 110 |
| Breadth of right supratemporal fenestra | 133 |
| Length of left supratemporal fenestra | 111 |
| Breadth of left supratemporal fenestra | 130 |
| Length of right orbit | 68 |
| Breadth of right orbit | 77 |
| Length of left orbit | 72 est. |
| Breadth of left orbit | 68 est. |
| Length of external narial aperture | 39 |
| Breadth of external narial aperture | 46 |
| Length, tip of premaxillaries to posterior end of tooth row | 744 est. |
| Length of right palatine fenestra | 223 est. |
| Breadth of right palatine fenestra | 82 |
| Length of left palatine fenestra | 234 est. |
| Breadth of left palatine fenestra | 89 |
| Breadth of occipital condyle | 61 |
| Height of occipital condyle | 47 |
| Breadth, right glenoid surface | 80 |

Lower Jaws.—Type, Amer. Mus. No. 5850.

| | |
|---|---|
| Length (restored) | 1140 |
| Length of symphysis (restored) | 467 |
| Length of tooth row (median, restored) | 655 |
| Breadth, maximum | 448 |
| Breadth of symphysis, maximum | 103 est. |
| Breadth of symphysis, minimum (restored) | 55 |
| Breadth of right articular surface | 72 |
| Breadth of left articular surface | 72 |
| Length of right postarticular process | 158 |
| Length of left postarticular process | 160 est. |
| Height of symphysis, minimum | 27 est. |

LOWER JAWS.—Paratype, Amer. Mus. No. 5849.

| | |
|---|---|
| Length | 1243 |
| Length of symphysis | 450 est. |
| Length of tooth row (median) | 820 est. |
| Breadth, maximum | 475 |
| Breadth of symphysis, maximum | 123 est. |
| Breadth of symphysis, minimum | 76 |
| Breadth of right articular surface | 88 est. |
| Breadth of left articular surface | 85 est. |
| Length of right postarticular process | 173 est. |
| Length of left postarticular process | 168 |
| Height of symphysis, minimum | 25 |

## CONCLUSIONS

Two species of *Teleorhinus* evidently inhabited the Montana-Wyoming interior sea contemporaneously during Benton time. One of these, *T. browni*, was exceedingly slender. The other, the new species, *T. robustus*, was more massive in construction, and evidently had somewhat different habits and perhaps diet, from the first species.